I Claim:

1. A method for tuning a feedforward compensation parameter in a motion control system, the method comprising:

a) determining an initial value of a feedforward compensation parameter;

b) commanding an initial movement of an actuator according to a test motion routine, wherein the initial value of the parameter is used in the control of the actuator;

c) determining error associated with the initial movement;

d) determining a potential value of the feedforward compensation parameter;

e) commanding a movement of the actuator according to the test motion routine, wherein the potential value of the parameter is used in the control of the actuator;

f) determining error associated with the movement commanded in act e);

g) comparing the errors associated with the movements;

h) based on the act of comparing the errors, selecting one of the values as a current best value; and

i) repeating acts d) - h) until the current best value is an optimum value, wherein the act of comparing the errors associated with the movements comprises comparing the errors associated with at least two of the movements.

2. A method according to claim 1, wherein the feedforward compensation parameter being tuned is one of a plurality of feedforward compensation parameters, further comprising using optimum values determined for the other feedforward compensation parameters in the control of the actuator for the commanded movements.

3. A method according to claim 2, wherein the feedforward compensation parameter being tuned comprises a time-shift parameter and the other feedforward compensation parameters comprise at least one of an acceleration feedforward gain, a Coulomb friction feedforward gain, a viscous friction feedforward gain, a constant offset feedforward gain, a proportional gain, and an integral gain.

4. A method according to claim 2, further comprising determining the optimum values for the other feedforward compensation parameters prior to commanding any of the movements.

5. A method according to claim 4, wherein a user can determine for each of the optimum values determined for the other feedforward compensation parameters whether that value will be used during normal operation of the motion control system, further comprising temporarily using each of the optimum values determined for the other feedforward compensation parameters during the movements regardless of whether the user determined it should be used during normal operation of the motion control system.

6. A method according to claim 1, wherein the test motion is associated with a swept sine chirp waveform.

7. A method according to claim 1, wherein the acts of determining error comprises determining a following error.

8. A method according to claim 1, wherein the act of comparing the errors comprises comparing a root mean squared value of each of the errors.

9. A method according to claim 1, wherein the act of determining a potential value for the feedforward compensation parameter comprises using a technique based on a minimization algorithm to determine the potential value.

10. A method according to claim 1, further comprising determining whether the current best value is the optimum value.

11. A method according to claim 10, wherein the act of determining whether the current best value is the optimum value comprises:

a) identifying which of the values is a second best value;

b) determining whether there is a significant percentage change between the second best value and the current best value.

12. A method according to claim 10, wherein the act of determining whether the current best value is the optimum value comprises:

a) identifying which of the values is a second best value; and

b) determining whether there would be any substantial difference between using the current best value and the second best value.

13. A method for tuning a compensation parameter in a motion control system having an actuator, wherein the motion control system utilizes a position command and a feedforward command to control motion of the actuator, and the compensation parameter compensates for time-shift relationships in the system, the method comprising:

a) determining an initial value of the compensation parameter;

b) commanding an initial movement of an actuator according to a test motion routine, wherein the initial value of the parameter is used in the control of the actuator;

c) determining error associated with the initial movement;

d) determining a potential value of the parameter;

e) commanding a movement of the actuator according to the test motion routine, wherein the potential value of the parameter is used in the control of the actuator;

f) determining error associated with the movement commanded in act e);

g) comparing the errors associated with the movements;

h) based on the act of comparing the errors, selecting one of the values as a current best value; and

i) repeating acts d) - h) until the current best value is an optimum value, wherein the act of comparing the errors associated with the movements comprises comparing the errors associated with at least two of the movements.

14. A motion control system comprising:

a) a position command generator adapted to produce position commands;

b) a feedforward command generator adapted to produce feedforward commands based upon feedforward compensation parameters, wherein one of the feedforward compensation parameters comprises a time-shift compensation parameter that compensates for time-shift relationships in the system;

c) a controller adapted to communicate with an actuator, the position command generator, and the feedforward command generator, and adapted to control the motion of the actuator based upon the position commands and feedforward commands; and

d) a feedforward tuning unit adapted to:

i) determine an initial value of the time-shift compensation parameter;

ii) cause the position command generator to produce position commands according to a test motion routine, wherein the initial value of the time-shift compensation parameter is used in the control of the actuator and the actuator undergoes an initial movement;

iii) determine error associated with the initial movement;

iv) determine a potential value of the time-shift compensation parameter;

v) cause the position command generator to produce position commands according to the test motion routine, wherein the potential value of the time-shift compensation parameter is used in the control of the actuator and the actuator undergoes movement;

vi) determine error associated with the movement wherein the potential value was used in the control of the actuator;

vii) compare the errors associated with the movements;

viii) select one of the values as a current best value based on the comparison; and

ix) repeat actions in iv) - viii) until the current best value is an optimum value, wherein the feedforward tuning unit compares the errors associated with at least two of the movements.

15. A motion control system according to claim 14, wherein the feedforward tuning unit is adapted to communicate with at least one of the actuator, controller, position command generator, and the feedforward command generator via a data communication network and in compliance with a communications protocol.

16. A motion control system according to claim 15, wherein the communications protocol comprises hypertext transfer protocol.

17. A motion control system according to claim 14, wherein the position command generator, feedforward command generator, and feedforward tuning unit are incorporated within a computer numerical control unit and the controller comprises a servocontroller.

18. A motion control system according to claim 14, wherein the feedforward tuning unit comprises a finite state machine.

19. A computer readable medium comprising instructions for performing the method of claim 1.

20. A computer readable medium comprising instructions for performing the method of claim 13.